

# DRAFT

## WILDLIFE INVENTORY PLAN 1993

PARKER RIVER NATIONAL WILDLIFE REFUGE  
NEWBURYPORT, MASSACHUSETTS

Prepared by: \_\_\_\_\_ Date: \_\_\_\_\_  
Refuge Biologist

Submitted by: \_\_\_\_\_ Date: \_\_\_\_\_  
Refuge Manager

Reviewed by: \_\_\_\_\_ Date: \_\_\_\_\_  
Refuge's North Biologist

Reviewed by: \_\_\_\_\_ Date: \_\_\_\_\_  
Supervisory Regional Biologist

Reviewed by: \_\_\_\_\_ Date: \_\_\_\_\_  
Associate Manager, North

Approval: \_\_\_\_\_ Date: \_\_\_\_\_  
ARD-Refuges & Wildlife

File: wildinve.pln 8/17/93

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## REFUGE OBJECTIVES

Parker River National Wildlife Refuge (Refuge) was established in 1942 initially to protect and preserve migratory waterfowl. Today, the Refuge strives to preserve and maintain an optimal mix of natural and managed habitats for a diversity of migratory birds, endangered species, and indigenous wildlife species.

Refuge wetlands provide habitat for waterfowl during the spring and fall migration, for wintering black ducks and Canada geese, and supports a small nesting population of dabbling ducks. Fall shorebird migrations are significant utilizing Refuge impoundments, salt pannes, and shoreline. A diversity of marsh and wading birds utilize Refuge habitats for feeding and nesting. Endangered species include the piping plover, Federally listed as threatened, and the least tern, State listed Species of Special Concern, which nest on the Refuge beach. Parker River National Wildlife Refuge is also host to a variety of resident mammalian species.

The 4,462 acre Refuge includes over six miles of pristine barrier beach habitat on the southern two-thirds of Plum Island. Parker River National Wildlife Refuge represents one of the few natural barrier island complexes remaining on the heavily developed Atlantic Coast. Behind the beach and dune habitat lie extensive salt marsh interspersed with ditches, creeks, mudflats, and salt pannes. Two miles of dikes impound three rainfall-dependent freshwater wetlands which add diversity to the barrier island ecosystem. A small percentage of uplands are maintained as open fields.

In addition to its primary emphasis, wildlife-oriented recreational use of Parker River NWR has been encouraged to the extent these activities are compatible with the purposes for which the Refuge was established. The area is a popular tourist attraction and the Refuge receives an estimated 300,000 visits annually for birdwatching, nature study, photography, surf fishing, clamming, waterfowl and deer hunting, environmental education, beach use, and other recreational activities.

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**Refuge:** Parker River NWR

**Procedure No.:** 1

**Species:** White-tailed Deer

**Title:** Spotlight Deer Survey

## I. Purpose

To collect annual data on doe:fawn and doe:buck ratios for assessing (potential) population growth. The doe:fawn and doe:buck ratio obtained from the survey should be applied to the population estimate obtained from the winter aerial deer survey to project the fall population. This information will be used to assess the need for a hunt to maintain the population within the desired carrying capacity of 15 to 30 animals. The spotlight survey also provides a long-term population index, and should not be used as an actual population count. The survey can also be used to provide a fox index.

## II. Procedure

### Personnel/Equipment:

- 3 staff (driver/observer, spotlihter/recorder, observer)
- 2-wheel drive vehicle (van for higher viewpoint)
- binoculars - 3 pairs
- spotlight - 200,000 candlepower, 12-volt, handheld
- police-style whistle
- pencil/clipboard
- spotlight deer survey form and route map (attachment)

**Personnel Qualifications:** Observers should have good night vision.

**Notification:** Law Enforcement staff should notify the Newbury, Rowley, and Ipswich Police Departments of spotlighting activities prior to the survey.

**Weather Conditions:** The survey should not be conducted if winds are in excess of 15-20 mph or if rain or fog is heavy enough to hamper the spotlight.

**Dates/Frequency:** A minimum of 10 surveys should be conducted weekly during September and October and bi-weekly in November.

**Time/length:** Begin 90 minutes after sunset. entire survey should take approximately 90 minutes.

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**Route:** Refer to the Spotlight Deer Survey Route map. Begin just inside the Refuge gate, proceed south on the Refuge road to Knobb's Road. Proceed north on the Bill Forward Pool and North Pool dike to Subheadquarters. At that point counting will cease unless an obvious new deer is observed. Proceed south on the Refuge road and resume counting south of Knobb's Road. If Cross Farm Hill is passable, proceed to the top of the hill and back to the road. Continue south to Stage Island and proceed along the dike to the field at the top of the hill until the end of the field can be observed. Turn around and drive on the south edge of Stage Island surveying Stage Island Pool. The survey is completed at the water control structure.

**Methods:** Proceed slowly (10 mph) along the designated route, the thicker the vegetation, the slower. The observer on the passenger side will shine the spotlight on the right side of the road. The spotlight should be kept moving to thoroughly cover an area. Only deer on the right side of the road will be counted with the exception of the North and Bill Forward Pool dike where the spotlight should be alternated between the Pools and salt marsh sides with both sides counted. Upon sighting deer, the observers should stop the vehicle and using binoculars, identify doe, buck, or fawn (September/October only) on the Deer Spotlight Survey form. Other mammals observed, particularly fox, will be recorded on the survey form.

**Data analysis/report:** The September/October surveys, only, are used to calculate a doe:fawn ratio as it becomes too difficult to distinguish fawns in November. All surveys are used to calculate a doe:buck ratio. The ratios should be based on at least 10 surveys. The doe:fawn ratio is obtained by dividing the total number of fawns by the total number of does observed during the September/October surveys. The doe:buck ratio is obtained by dividing the total number of bucks by the total number of does observed on all surveys. A summary report should be prepared at the end of the survey period and filed with the survey forms.

### III. Special Considerations

A minimum of 10 surveys should be conducted for best results. Occasionally, other deer may be present in a group but not observed because their eye reflection may not be visible. An attention-eliciting sound consisting of a short (1-2 second) blast on a police-style whistle should be used to cause the deer present to turn toward the spotlight, thus making their eye reflection visible to the observers for identification.

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## IV. Staffing and Costs

**Staff:** 3 staff @ 2 hours/survey = 6 staff hours/survey x 10 surveys = 60 staff hours @ \$13/hr (GS-9) = \$780 total staff cost.

**Equipment:** On hand

**Materials:** Gas - 1 gal/survey x 10 surveys = 10 gal @ \$1/gal = \$10.

**Total cost:** \$790

Prepared by: \_\_\_\_\_ Date: \_\_\_\_\_  
Refuge Biologist

Reviewed by: \_\_\_\_\_ Date: \_\_\_\_\_  
Refuge Manager

Approved by: \_\_\_\_\_ Date: \_\_\_\_\_  
ARD-Refuges & Wildlife

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**Refuge:** Parker River NWR  
**Species:** White-tailed Deer  
**Title:** Aerial Deer Survey

**Procedure No.:** 2

## I. Purpose

Winter conditions on the refuge afford an opportunity to conduct an aerial survey of the deer herd because of the relative openness of the habitat. This survey provides an annual minimum winter population index which combined with the doe:fawn and doe:buck ratios of the previous fall can be used in assessing (potential) population growth. The deer population should be closely monitored to safeguard against a recurrence of the habitat damage which resulted from an overpopulation of deer in the mid-1980's. The survey data will be used to make sound biological decisions regarding management of the herd within recommended carrying capacity of a maximum limit of 35 animals (Refuge Master Plan 1986). The survey can also be used to provide a fox index.

## II. Procedure

### Personnel/Equipment:

- helicopter (4 seater) and OAS approved pilot  
(Wiggins Airways, Norwood, MA 617/762-5690)
- 3 staff (2 observers-back right and left sides,  
1 recorder front)
- personal protective equipment:  
(see OAS-Basic Aviation Safety manual)
  - aviator's helmet
  - nomex clothing
  - leather gloves
  - leather boots
- pencils/clipboard - 3 sets
- Aerial deer survey form and transects map (attachment)

**Personnel Qualification:** Personnel should have good vision and not be susceptible to air sickness.

**Weather Conditions:** A minimum of 4" of snow should be present on nearly 100% of the survey area. The survey should not be conducted if high winds blow most of the snow coverage from open areas (fields and interdunes). Other conditions are up to the discretion of the pilot.

**Dates/Frequency:** Two flights should be scheduled between

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December 15 and February 28; however, based on the relatively mild winters, the survey may have to be scheduled at the first snowfall, regardless of dates. If snowfall is sufficient flights should be within 7 to 10 days of each other.

**Time/Length:** Between 10am and 12 noon, as shadows will be the shortest during this period. Approximately 1 hour for entire survey.

**Route:** Refuge to Aerial Deer Survey Transects map. Begin at lot#1 and proceed south over the Island in approximately 28 east-west transects spaced 1/4 mile apart. The western side of Sandy Point State Reservation and Stage Island, and all of Grape Island are completed on the return trip to lot#1.

**Methods:** The route should be flown at an altitude of 170' to 250'. If deer are too easily spooked, the altitude should be adjusted to the upper end of the range. The altitude should be decreased to 100' to 150' over the new Pines area to flush deer out into the open where they can be counted. Speed should be maintained at approximately 30 mph throughout the survey. The forward recorder/observer will assist the pilot in flying the transects and in sighting deer. The back right and left observers will list sightings on the Aerial Deer Survey form and will call the sightings to the recorder who will plot the sightings and the number observed on the map. Sightings do not need to be listed or mapped according to the specific transect location. The survey can also be used to count fox, muskrat lodges, wintering waterfowl, and to survey habitat conditions, particularly on the return flight.

**Data Analysis/Report:** The total number of deer observed reflects a minimum wintering population. It is estimated that approximately 25% of the deer present are missed because of the heavy cover in the New Pines area and likelihood of missing deer which hold their positions in vegetated areas. The minimum population index is then increased by 25%. The doe:fawn and doe:buck ratios obtained from the previous fall spotlight surveys are then applied to this index to project the following years fall population. (Note, this estimate may be reduced by ingress/egress and natural and hunt mortality.) Any known mortalities throughout the following year should be recorded to assess the accuracy of the fall projection based on the minimum estimate obtained in the following winter survey. A summary report should be completed and filed with the survey forms.

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### III. Special Considerations

The pilot and airline must be OAS-approved and all staff must wear personal protective equipment listed in the OAS - Basic Aviation Safety manual. Payment must be processed through OAS with an Aircraft Use Report (OAS-23). The cost of the survey can be split with Crane Beach, Trustees of Reservations (Dave Rimmer, 508/921-1944). The Refuge pays for the survey time on the Refuge and the to shuttle from Norwood and Crane Beach pays for the survey time on Crane Beach and the return shuttle.

The New Pines area is difficult to survey because of the dense cover. The survey should be flown lower and slower over this area.

### IV. Staffing and Costs

**Staff:** 3 staff @ 1 hour/survey = 3 staff hours/survey x 2 surveys = 6 staff hours @ \$13/hr (GS-9) = \$78 total staff cost.

**Equipment:** Helicopter - \$435/hour x 1.3 hours/survey & shuttle = \$565 x 2 surveys = \$1130.

**Materials:** On hand

**Total Cost:** \$1208

Prepared by: \_\_\_\_\_ Date: \_\_\_\_\_  
Refuge Biologist

Reviewed by: \_\_\_\_\_ Date: \_\_\_\_\_  
Refuge Manager

Approved by: \_\_\_\_\_ Date: \_\_\_\_\_  
ARD-Refuges & Wildlife

**Refuge:** Parker River NWR

**Procedure No.:** 3

**Species:** Predators

**Title:** Predator Scent Station Survey

## **I. Purpose**

To obtain an annual population index on various predators. The survey data will be used to make sound biological decisions regarding management of predators which prey on nesting waterfowl and endangered species (piping plover-federally listed, least tern-state listed).

## **II. Procedure**

### **Personnel/Equipment:**

- 1 staff
- 20 commercial predator scent tabs
- disposable plastic gloves
- 3' diameter stiff wire circular hoop
- framed 1/4" mesh screen sifter
- hand tools - axe, brushcutter
- shovel
- rake
- whisk broom
- presifted dirt/grain bags
- animal track field guide
- pencil/clipboard
- Predator Scent Station Survey form (attachment)
- Predator Scent Station Survey Sites (map attachment)

**Personnel qualifications:** Ability to identify tracks of individual predators.

**Weather conditions:** The survey will not be conducted if rain or very strong winds are forecast which would render the stations inoperable.

**Dates/Frequency:** The survey line will be run once annually in late September/early October.

**Time/Length:** The survey should be run in the morning. The entire survey takes approximately 2 hours. Preparation of the sites takes approximately 5 hours.

**Route:** Refer to the Predator Scent Station Survey Sites map for location of stations. The first station is established .3 miles south of the entrance gate with the remaining sites .3 miles apart on alternating sides of the main Refuge road for a total of 20 sites. The distance between each site is measured by vehicle

odometer. Each station is approximately 10' from the road. The stations are marked with a red survey flag and should be used from year to year.

**Methods:** The scent station consists of a 3' diameter circle which is cleared of all vegetation with hand tools. The diameter is checked with a 3' hoop of stiff wire. Dirt is transported to the stations in grain bags and sifted through the mesh screen sifter to a depth of approximately 1/2". The night before the survey, the soil is smoothed over and a commercial predator scent tab placed in the center. The following morning each station is examined and each individual species noted as a visit on the Predator Scent Station Survey form. The condition of the station is noted as operable or inoperable. The survey should not be run if less than 6 of 10 stations are inoperable. Scent disks are removed from each station after being surveyed and disposed of off-site. The success of the survey depends on the odor being new to the animals.

**Data analysis/report:** At the end of the survey, the number of visits for each species is totaled. This information provides an annual population index for comparison. A summary report should be completed and filed with the survey forms.

### III. Special Considerations

The survey should not be run if less than 6 of 10 stations are inoperable. In order to compare the data on an annual basis, the same locations should be used to the greatest extent possible based on the map and flagged locations.

### IV. Staffing and Costs

**Staff:** 1 staff @ 2 hours/survey + 5 hours/site prep. = 7 staff hours @ \$13/hr (GS-9) = \$91 total staff cost.

**Equipment:** On hand.

**Materials:** Scent tabs = \$32

**Total cost:** \$123

**Prepared by:** \_\_\_\_\_ **Date:** \_\_\_\_\_  
Refuge Biologist

**Reviewed by:** \_\_\_\_\_ **Date:** \_\_\_\_\_  
Refuge Manager

**Approved by:** \_\_\_\_\_ **Date:** \_\_\_\_\_  
ARD-Refuges & Wildlife

**Refuge:** Parker River NWR

**Procedure No.:** 4

**Species:** Waterfowl

**Title:** Waterfowl Breeding Pair Survey

## **I. Purpose**

To obtain an annual minimum estimate of breeding pairs for North, Bill Forward, and Stage Island Pools. This estimate can be compared with the actual broods observed during the brood survey as a measure of nest success.

## **II. Procedure**

### **Personnel/Equipment:**

- 10 staff/volunteer observers
- 5 - 2-wheel drive vehicles
- portable radios
- binoculars/spotting scope
- pencil/clipboard
- observation platforms
- bird ID field guide
- mosquito/tick repellent
- Waterfowl Breeding Pair Survey form (attachment)
- Waterfowl Breeding Pair/Brood Survey Stations (map attachment)

### **Personnel qualifications:**

- o Ability to identify both sexes of various species of ducks.
- o Volunteers must provide own binoculars and spotting scope as Refuge equipment is limited.
- o Must be able to tolerate mosquitos and ticks and to sit quietly and observe for a period of time.
- o Deer Island observer must be able to physically climb the observation platform.

**Weather conditions:** The survey should not be conducted if winds are in excess of 15-20 mph, or fog or rain is sufficient to hamper the survey.

**Dates/Frequency:** The survey should be conducted once in late April. The exact date will depend on conditions in a particular year.

**Time/Length:** Observers should be in place 15-30 minutes prior to the survey. The survey should be conducted the first two hours after sunrise or the last two hours before sunset. Both sunrise and sunset surveys are equally as productive; however, morning is preferable because of improving light conditions. However, sunrise surveys may not be feasible because of the difficulty of recruiting volunteers for the morning.

**Area:** Observation stations and associated survey areas are detailed on the Waterfowl Breeding Pair/Brood Survey Stations map: North Pool-5 stations; Bill Forward Pool-2 stations; Stage Island Pool-3 stations. These stations should be used from year to year.

**Methods:** The Deer Island observation platform should be set-up at least 1 day prior to the survey. The Stage Island and Hellcat Swamp towers will be used as observation stations with vehicles used as stationary blinds on the remaining dike stations. All observers should be in place at least 15-30 minutes before the survey begins. Observers should be particularly attentive during peak activity times which are the first hour of daylight and the last hour before sunset. Observers should quietly observe the Pool and record lone drakes, flocked drakes, breeding pairs, and groups on the Waterfowl Breeding Pair Survey form. Observers should closely coordinate with adjacent observers with radios (quietly) during the survey or immediately after the survey to avoid double counting. Radios can also be used to fine tune survey boundaries prior to the survey.

**Data analysis/report:** A summary report should be prepared and filed with the survey forms. The number of pairs will be compared with the number of broods on the follow-up brood survey.

### **III. Special Considerations**

Experienced observers are needed on this survey. The same volunteers should be used from year to year as much as possible to maintain consistency. Inexperienced volunteers should be paired with experienced observers. Observers must remain quiet throughout the entire survey. Driving on the dikes should be kept to a minimum when ferrying observers to their sites and also on the day of the survey to avoid disturbance and subsequent movement of the birds. Additional platforms should be constructed to replace vehicles on the North and Stage Island Pool dike stations.

**IV. Staffing and Costs**

**Staff:** 4 staff @ 3 hours/survey = 12 staff hours @ \$13/hr (GS-9)  
= \$156 total staff cost.

**Equipment:** On hand.

**Materials:** On hand.

**Total cost:** \$156

**Prepared by:** \_\_\_\_\_ **Date:** \_\_\_\_\_  
Refuge Biologist

**Reviewed by:** \_\_\_\_\_ **Date:** \_\_\_\_\_  
Refuge Manager

**Approved by:** \_\_\_\_\_ **Date:** \_\_\_\_\_  
ARD-Refuges & Wildlife

**Refuge:** Parker River NWR

**Procedure No.:** 5

**Species:** Waterfowl

**Title:** Waterfowl Brood Survey

## **I. Purpose**

To obtain an annual minimum estimate of brood production for the North, Bill Forward, and Stage Island Pools. This estimate can be used to assess the management program at each of the Pools.

## **II. Procedure**

### **Personnel/Equipment:**

- 10 staff/volunteer observers
- 5 - 2-wheel drive vehicles
- portable radios
- binoculars/spotting scope
- pencil/clipboard
- observation platforms
- bird ID field guide
- mosquito/tick repellent
- Waterfowl Brood Survey form (attachment)
- Waterfowl Breeding Pair/Brood Survey Stations (map attachment-see Breeding Pair Survey)
- Plumage Classes and Subclasses of Ducklings (Gollop and Marshall 1954)
- Waterfowl Aging Chart (Gollop and Marshall 1954)

### **Personnel qualifications:**

- o Ability to identify hen ducks of various species and to separate ducklings into various classes and subclasses.
- o Volunteers must provide own binoculars and spotting scope as Refuge equipment is limited.
- o Must be able to tolerate mosquitoes and ticks and sit quietly and observe for a period of time.
- o Deer Island observer must be able to physically climb the observation platform.

**Weather conditions:** The survey should not be conducted if winds are in excess of 15-20 mph, or fog or rain is sufficient to hamper the survey.

**Dates/Frequency:** The survey should be conducted once in late June/early July. The exact date will depend on conditions in a particular year.

**Time/Length:** Observers should be in place 15-30 minutes prior to the survey. The survey should be conducted the first two hours after sunrise or the last two hours before sunset. Both sunrise and sunset surveys are equally as productive; however, morning is preferable because of improving light conditions. However, sunrise surveys may not be feasible because of the difficulty of recruiting volunteers for the morning.

**Area:** Observation stations and associated survey areas are detailed on the Waterfowl Breeding Pair/Brood Survey Stations map: North Pool-5 stations; Bill Forward Pool-2 stations; Stage Island Pool-3 stations. These stations should be used from year to year.

**Methods:** The Deer Island observation platform should be set-up at least 1 day prior to the survey. The Stage Island and Hellcat Swamp towers will be used as observation stations with vehicles used as stationary blinds on the remaining dike stations. All observers should be in place at least 15-30 minutes before the survey begins. Observers should be particularly attentive during peak activity times which are the first hour of daylight and the last hour before sunset. Observers should quietly observe the Pool and record time, species, # of young, brood class, and direction of movement on the Waterfowl Brood Survey form. Observers should closely coordinate with adjacent observers with radios (quietly) during the survey or immediately after the survey to avoid double counting. Radios can also be used to fine tune survey boundaries prior to the survey.

**Data analysis/report:** Data should be compared with the number of breeding pairs from the previous survey. A summary report will be prepared for submission to the Regional Migratory Bird Coordinator and filed with the survey forms.

### III. Special Considerations

Experienced observers are needed on this survey. The same volunteers should be used from year to year as much as possible to maintain consistency. Inexperienced volunteers should be paired with experienced observers. Observers must remain quiet throughout the entire survey. Driving on the dikes should be kept to a minimum when ferrying observers to their sites and also on the day of the survey to avoid disturbance and subsequent movement of the birds. Additional platforms should be constructed to replace vehicles on the North and Stage Island Pool dike stations. Aerial brood surveys of the Refuge salt marsh will be explored in the future.

**IV. Staffing and Costs**

**Staff:** 4 staff @ 3 hours/survey = 12 staff hours @ \$13/hr (GS-9)  
= \$156 total staff cost.

**Equipment:** On hand.

**Materials:** On hand.

**Total cost:** \$156

Prepared by: \_\_\_\_\_ Date: \_\_\_\_\_  
Refuge Biologist

Reviewed by: \_\_\_\_\_ Date: \_\_\_\_\_  
Refuge Manager

Approved by: \_\_\_\_\_ Date: \_\_\_\_\_  
ARD-Refuges & Wildlife

**Refuge:** Parker River NWR

**Procedure No.:** 6

**Species:** Common Tern

**Title:** Common Tern Survey

## **I. Purpose**

To estimate the size of the breeding population of several local colonies. The data is provided to the Massachusetts Division of Fisheries and Wildlife (MADFW) for their cooperative state-wide shorebird census.

## **II. Procedure**

### **Personnel/Equipment:**

3 staff (boat operator, 2 observers-right & left side)  
Boston Whaler  
3 PFD's (Coast Guard approved)  
binoculars  
bird ID field book  
pencil/clipboard  
topographic map (Newburyport East, Mass-NH;  
Ipswich, Mass quadrants)  
MADFW Cooperative Shorebird & Colonial Waterbird  
Census Form (attachment)  
Common Tern Census Route (map attachment)

### **Personnel qualifications:**

- o The operator must be experienced in the operation of a Boston Whaler and knowledgeable about local tides.
- o All staff must be able to swim.
- o Observers should be experienced in estimating large numbers of birds.
- o Observers should be experienced in the identification of common terns and other terns that may be nesting within the colonies.

**Notification/Coordination:** Coordinate with the Natural Heritage Program, MADFW (Brad Blodgett, Ornithologist, 508/792-7275) which organizes the survey. Notify the owner (Peter Richardson, 59 Plum Island Turnpike, Newbury, MA, 462-8619) of Woodbridge Island prior to the survey. Coordinate with the Trustees of Reservation (David Rimmer, Biologist, 508/921-1944) to avoid duplication.

**Weather conditions:** The survey should not be conducted in unseasonably cold or hot temperatures, precipitation, fog, or winds greater than 15-20 mph.

**Dates/Frequency:** The survey should be conducted on a single day within the official State census period established by the MADFW, typically June 1 through 10.

**Time/Length:** The survey should be conducted in early morning or late afternoon to minimize exposure of eggs and young. The entire survey should take approximately 2.5 hours and should be timed with the peak of high tide.

**Route:** Refer to the Common Tern Census Route map for details. Launch the boat from the Refuge launch site across from parking Lot #1. Proceed north to Woodbridge Island, then south along the Plum Island River. Off of this river, follow Little Pine Island Creek, Pine Island Creek, and Jericho Creek as far as possible, and Parker River to the Route 1A bridge.

**Methods:** Pairs are counted in the air from the boat. Birds may need to be flushed by foot to obtain an accurate count.

**Data analysis/report:** Field notes will be transcribed onto the MADFW Cooperative Shorebird and Colonial Waterbird Census form. Originals are submitted to Brad Blodgett, State Ornithologist, Natural Heritage Program, MADFW, 1 Rabbit Hill Road, Westboro, MA 01581. A summary report, including a copy of the Census form, should be prepared for the files.

### III. Special Considerations

Water safety, including a float plan and use of life jackets, should be strictly adhered to. Breeding Forster's Terns should be closely watched for. A pair, believed to be nesting, was observed within the common tern colony near the mouth of the Parker River in 1991. A pair was also reported for Plum Island the previous year. This represents the first nesting record for the species in Massachusetts and most likely in New England.

### IV. Staffing and Costs

**Staff:** 3 staff @ 2.5 hours/survey = 7.5 staff hours @ \$13/hr (GS-9) = \$98.

**Equipment:** On hand.

**Materials:** Gas - 7 gal/survey @ \$1/gal = \$7.

**Total cost:** \$105

**Prepared by:** \_\_\_\_\_ **Date:** \_\_\_\_\_  
Refuge Biologist

**Reviewed by:** \_\_\_\_\_ **Date:** \_\_\_\_\_  
Refuge Manager

**Approved by:** \_\_\_\_\_ **Date:** \_\_\_\_\_  
ARD-Refuges & Wildlife

**Refuge:** Parker River NWR

**Procedure No.:** 7

**Species:** Piping Plover/Least Tern

**Title:** Piping Plover/Least Tern Survey

## **I. Purpose**

To monitor population and productivity of the piping plover (Federally-listed threatened) and least tern (State Species of Special Concern) for comparison on an annual basis. This data will be used to access the Refuge management program. The data is also provided to the Massachusetts Division of Fisheries and Wildlife (MADFW).

## **II. Procedure**

### **Personnel/Equipment:**

2 staff observers

ATV

7 X 35 binoculars

20X spotting scope

pencil/clipboard

sunscreen/block

Forms (attachments):

Piping Plover/Least Tern Survey

Piping Plover/Least Tern Survey Location map

Piping Plover Nest/Chick Record

MADFW Piping Plover Observation Form

Least Tern Colony Record

MADFW Cooperative Shorebird & Colonial Waterbird Census

**Personnel qualifications:** Ability to operate an ATV.

**Weather conditions:** Surveys should not be conducted during inclement weather including extreme heat or cold, fog, rain, or winds in excess of 15-20 mph.

**Dates/Frequency:** Occasional beach surveys of plover activity will commence in mid to late March. Official surveys will commence the first week in April and will be conducted 3-4 times weekly during arrival and territory establishment of plovers. The frequency will increase to 4-6 times weekly in May for observation of pair bonding, nest initiation, and incubation, and will continue through August with hatching and fledging. Each nest and brood will be monitored 4-7 times weekly. The survey frequency will decrease to 2-3 times weekly after the young reach 35 days of age and up to the time the birds leave the Refuge usually in early to mid-August.

Tern surveys will begin with arrival of the terns typically in mid-May and will be conducted in conjunction with plover surveys.

**Time/Length:** Surveys early in the season will take approximately 2 hours. As the survey frequency increases in May through August, survey time will increase to 3-5 hours. Nest searches should be conducted in the early morning to avoid exposure of the eggs to heat and because the orientation of the sun in the morning is more advantageous for observation of plover tracks.

**Route:** The survey route will consist of the entire Refuge beach.

**Methods:** Plover surveys will be conducted by the Refuge staff by slowly driving the length of the beach on an ATV just above the mean high tide line. An ATV affords the observer a 360 degree view and eliminates the problem of vehicle ruts which can trap chicks. The wrack line should be avoided as much as possible. Plovers will be observed with binoculars and spotting scope. All survey data will be recorded on a Piping Plover/Least Tern Survey form and locations of birds will be marked on a Piping Plover/Least Tern Survey Location map. Staff will coordinate in the transfer of survey information. Nest searches will be conducted by walking transects through beach and dune habitat, observing behavior on a territory, and following tracks to the nest. Searchers will access an area to be searched by ATV or vehicles can be used to pick up and drop off searchers from boardwalk or beach access roads. During courtship peaks, nest searches will be conducted every other day at a minimum. All nests will be enclosed with triangular enclosures. Young chicks will be monitored closely, particularly from age 25 to 30 days for an estimate of successfully fledged birds. Plover nest and chick data will be transcribed from the survey forms onto Nest/Chick Record forms.

Least tern pairs will be recorded on each survey; however, nests in tern colonies will be censused only 3 times per week by walking transects through nesting colonies. Nests will be tracked with numbered markers. Data will be recorded on the Piping Plover/Least Tern Survey form and Location map. Field data will be transcribed onto Least Tern Colony Record forms.

Refer to the Annual Piping Plover and Least Tern Management Program for additional details on methodology.

**Data analysis/report:** A Piping Plover and Least Tern Summary Report will be prepared for the files and distribution to Federal and State legislator's, local officials, conservation organizations, and interested citizen's and groups. Piping plover data will be transcribed onto the MADFW Plover Observation Form and submitted with location maps to Scott Melvin, Rare Species Zoologist, Natural Heritage Program, MADFW, 1 Rabbit Hill Road, Westboro, MA 01581. Least Tern data will be transcribed onto the MADFW Cooperative Shorebird and Colonial Waterbird Census forms and submitted with location maps to Brad Blodgett, Endangered Species Biologist (Refer to Melvin's address). Copies of all forms will be filed.

### III. Special Considerations

Surveys should not be conducted during inclement weather because of exposure of eggs and chicks. Caution should be exercised in the use of the ATV and walking the beach to avoid crushing of nests, chick mortality, and stress to the birds. Disturbance by surveyors should be kept to a minimum.

### IV. Staffing and Costs

**Staff:** 2 staff @ 3 hours/survey x 100 surveys = 300 staff hours @ \$13/hr (GS-9) = \$3900 total staff cost.

**Equipment:** On hand.

#### Materials:

Gas - 1 gal/survey x 100 surveys = 100 gal @ \$1/gal = \$100.

String - 20 rolls @ \$4/roll = \$80.

Plastic ties - 4 bags @ \$7/bag = \$28.

"Bird Nesting Area" Signs - 10 signs @ \$5/sign = \$50.

**Total cost:** \$4158

Prepared by: \_\_\_\_\_ Date: \_\_\_\_\_  
Refuge Biologist

Reviewed by: \_\_\_\_\_ Date: \_\_\_\_\_  
Refuge Manager

Approved by: \_\_\_\_\_ Date: \_\_\_\_\_  
ARD-Refuges & Wildlife

**Refuge:** Parker River NWR

**Procedure No.:** 8

**Species:** Waterfowl, Marsh & Wading Bird, Shorebird & Raptors

**Title:** Bird Survey

## **I. Purpose**

To monitor species composition and numbers to determine seasonal and long term use of Refuge habitats.

## **II. Procedure**

### **Personnel/Equipment:**

- 3 volunteers (driver, observer, observer-recorder)
- 2-wheel drive vehicle (van for higher view point) - Refuge Road Survey
- 4-wheel drive vehicle - Beach Survey
- spotting scope
- binoculars - 3 pairs
- pencil/clipboard
- bird ID field guide
- Bird Survey forms (attachments)
- Bird Survey Route (map attachment)
- Bird Survey Habitat Types (map attachment)

**Personnel qualifications:** Ability to identify a diversity of bird species and to estimate large numbers.

**Weather conditions:** The survey should not be conducted if winds are in excess of 15-20 mph. Heavy precipitation and fog should be avoided.

**Dates/Frequency:** The Refuge bird surveys should be conducted year round--weekly during the migration periods (mid March - mid-May and mid-July - October) and bi-weekly during the remainder of the year. The Nelson Island survey should be conducted year round--bi-weekly during migration and monthly the remainder of the year. The Beach survey should be conducted weekly from mid-July to early September. This survey is dependent on the piping plover beach closure from April 1 - August 31. If sections of the beach are reopened throughout July and August, the survey should incorporate opened areas.

**Time/Length:** The Refuge survey involves approximately 4 hours; the Beach survey approximately 3 hours, and Nelson Island approximately 1 hour. Refuge and Nelson Island surveys should be centered 2 hours either side of high tide and the beach survey 1.5 hours either side of low tide.

**Route:** Refer to the Bird Survey Route map for the 3 survey routes.

Refuge Road Survey - Begin at the gatehouse and slowly proceed south on the Refuge road stopping at all suitable view points. Walk in to the gated field between lot #3 and subheadquarters to survey the salt marsh. Continue south on the road to subheadquarters and proceed south along the North Pool and Bill Forward Pool dike, out to the Knobbs, then return to the Refuge road. Proceed south on the Refuge road to Crossfarm Hill and drive to the top of the hill if conditions permit. Continue south on the Refuge road to Stage Island and proceed along the dike to the field at the top of the hill until the end of the field can be observed. Proceed to Stage Island Bluffs (winter only) to view wintering birds in the Sound. Turn around and drive on the south edge of Stage Island surveying the Pool. Proceed south on the Refuge road, stopping at the Stage Island observation tower. Proceed to Emerson's Rocks from lot #7 (winter only) to view wintering birds offshore. Proceed north along the Refuge road and complete the survey with observations along the road from Knobb's road to subheadquarters, stopping at Sea Haven (winter only) to observe wintering birds offshore.

Beach Survey - Conduct on open portions of the Refuge beach. The survey is primarily to monitor shorebirds, however, other survey species will be recorded, both onshore and offshore.

Nelson Island Survey - Conduct along the road from the parking lot to the bay.

Areas that can not be surveyed (i.e. Cross Farm Hill due to muddy conditions, closed beach sections) on any of the routes should be noted under Comments on the Survey form.

**Methods:** Proceed slowly along the designated route stopping frequently at good vantage points. Observations of waterfowl, marsh & wading birds, shorebirds, and raptors should be recorded on the appropriate Bird Survey forms based on habitat location. Refer to the Bird Survey Habitat Types map for a breakdown of Refuge habitats. Any rare, uncommon, and occasional sightings of other migratory birds should be recorded on the Rare, Uncommon, & Occasional Migratory Bird Sightings Survey form. This form could also be used to list first spring sightings of returning migrants.

**Data analysis/report:** Survey forms should be filed.

### **III. Special Considerations**

To the greatest extent possible, the same observers should be used from year to year to maintain consistency. Cross Farm Hill should not be surveyed during the bobolink nesting season from mid-May through mid-July or during wet conditions. When not surveyed, it should be noted on the survey form.

**IV. Staffing and Costs**

**Staff:** Volunteers

**Equipment:** On hand.

**Materials:** Gas - 2 gal/survey x 44 surveys = 88 gal @ \$1/gal  
= \$88.

**Total cost:** \$88.

Prepared by: \_\_\_\_\_ Date: \_\_\_\_\_  
Refuge Biologist

Reviewed by: \_\_\_\_\_ Date: \_\_\_\_\_  
Refuge Manager

Approved by: \_\_\_\_\_ Date: \_\_\_\_\_  
ARD-Refuges & Wildlife

Refuge: Parker River NWR

Procedure No.: 9

Species: Wetland Birds

Title: Wetland Bird Vocalization Survey

## I. Purpose

To determine species composition and numbers using the North, Bill Forward, and Stage Island Pools for comparison on an annual basis. Data will be used to assess the management program at each of the Pools. Additional wetland bird species will be added in subsequent surveys.

## II. Procedure

### Personnel/Equipment:

2 staff/volunteer  
canoe & PFD's  
tape recorder  
vocalization tape (MADFW)  
MADFW Wetland Bird Survey form (attachment)  
MADFW Wetland Bird Survey form instructions (attachment)  
Wetland Bird Survey map (attachment)

**Personnel qualifications:** Ability to recognize individual species vocalization response of various wetland birds.

**Weather conditions:** The survey should not be conducted if wind speed exceeds 12 mph or presence of a steady rain.

**Dates/Frequency:** The survey should be conducted 3 times between May 1 and June 30, with at least 10 days separating each of the visits.

**Time/Length:** The entire survey must be conducted between 1/2 hour before sunrise and 9 am. The length of the survey the size of the area surveyed.

**Route:** The priority areas include North, Bill Forward, and Stage Island Pools. Refer to the Wetland Bird Vocalization Survey form for details. Second priority areas, if time permits, include areas across from Stage Island, Stage Island ponds, and Stage Island pond. Survey stations should be established 100 (328') apart.

*listen first? then  
broadcast calls??  
is this right??  
JF  
✓*

**Methods:** At each survey station, begin with a 3 minute passive listening period, immediately followed by a broadcast sequence of the MADFW vocalization tape, and then move immediately to the next station. Broadcast the following species at each station: Virginia rail, sora rail, king rail, least bittern, green-backed

heron, marsh wren, and common moorhen. American bittern should be broadcast at every other station and pied-billed grebe at every third station. Record information on the MADFW Wetland Bird Survey form based on the Survey form instructions. On subsequent surveys, survey station order should be reversed or randomized.

**Data analysis/report:** Completed Survey forms should be submitted to Scott Melvin, Rare Species Zoologist, Natural Heritage Program, MADFW, 1 Rabbit Hill Road, Westboro, MA 01581. A summary report should be completed and filed with a copy of the forms.

### III. Special Considerations

This survey is conducted based on methodology prepared by the MADFW and is part of a larger survey for the State. The Refuge is considered one of the prime sites in Essex County. The Refuge will work closely with the USFWS funded graduate student responsible for the project who will assist the Refuge with the surveys.

### IV. Staffing and Costs

**Staff:** 2 staff @ 2 hours/survey x 9 surveys (3 pools) = 18 staff hours @ \$13/hr (GS-9) = \$234.

**Equipment:** On hand

**Materials:** On hand

**Total cost:** \$234.

Prepared by: \_\_\_\_\_ Date: \_\_\_\_\_  
Refuge Biologist

Reviewed by: \_\_\_\_\_ Date: \_\_\_\_\_  
Refuge Manager

Approved by: \_\_\_\_\_ Date: \_\_\_\_\_  
ARD-Refuges & Wildlife

**Refuge:** Parker River NWR

**Procedure No.:** 10

**Species:** Wood Ducks

**Title:** Wood Duck Nest Box Program

## **I. Purpose**

To establish a nesting population of wood ducks and to monitor the nest box program.

## **II. Procedure**

### **Personnel/Equipment:**

- 2 staff/volunteer
- waders
- step ladder
- canoe
- wood shavings
- clipboard/pencil
- bird nest ID field guide
- hornet/wasp spray
- Wood Duck Nest Box Survey form (attachment)
- Wood Duck Nest Box Locations listing & map (attachments)

**Personnel qualifications:** Ability to identify nests of wood ducks and other species which may use the nest box.

**Weather conditions:** Winter ice conditions are ideal for repairing, cleaning, and surveying boxes.

**Dates/Frequency:** If a volunteer is available, nest box surveys will be conducted every 7-10 days from mid-April to mid-June. Boxes will be cleaned out and surveyed each winter.

**Time/Length:** Approximately 3 hours each for spring and winter surveys.

**Box location:** Locations of the 7 boxes are detailed on the Wood Duck Nest Box Locations listing and map.

**Methods:** Nest boxes should be opened and checked by a volunteer every 7-10 days each spring for use by starlings and other undesirable species (house sparrows, mammals, bees, hornets, wasps). Starling and house sparrow nests will be removed only when incubation of a full clutch has begun. Others will be removed immediately. During the winter, boxes will be surveyed, repaired, cleaned out, and wood shavings replaced. This can be accomplished by a staff person knowledgeable in nest identification and a volunteer to assist. Species use will be recorded on the Wood Duck Nest Box Survey form.

**Data analysis/report:** The survey form will be filed. If boxes are removed or relocated, the location listing and map will be updated and a memo for the files prepared detailing the changes.

### III. Special Considerations

The program will be monitored each year and boxes removed or relocated based on use and habitat conditions. The number of boxes should not exceed 8-10. Predator tunnels which were removed to encourage use should not be replaced until a nesting population is well established. New birds are hesitant to enter the tunnels. Predator cones should be well maintained so the boxes do not provide habitat for undesirable species including raccoons. Starling use of the boxes should be controlled for several years to knock back the nesting population which has established on the Refuge. Starling nests should not be removed prior to incubation, as the birds can quickly rebuild. Once a nest is established, it takes 7-9 days to rebuild a nest.

### IV. Staffing and Costs

**Staff:** 1 staff @ 3 hours/winter survey = 3 staff hours @ \$13/hr (GS-9) = \$39 total staff cost.

**Equipment:** On hand.

**Materials:** On hand.

**Total cost:** \$39

Prepared by: \_\_\_\_\_ Date: \_\_\_\_\_  
Refuge Biologist

Reviewed by: \_\_\_\_\_ Date: \_\_\_\_\_  
Refuge Manager

Approved by: \_\_\_\_\_ Date: \_\_\_\_\_  
ARD-Refuges & Wildlife

**Refuge:** Parker River NWR

**Procedure No.:** 11

**Species:** Purple Martin

**Title:** Purple Martin Nest Box Program

## **I. Purpose**

To provide nesting habitat for purple martins and to monitor the success of the nest box program.

## **II. Procedure**

### **Personnel/Equipment:**

- 1 staff
- 4-6 volunteers
- extension ladder
- clipboard/pencil
- bird nest Id field guide
- Purple Martin Nest Box Survey form (attachment)
- Purple Martin Nest Box Locations listing & map (attachments)

**Personnel qualifications:** Ability to identify purple martin nests and other species which may use the nest box.

**Weather conditions:** For safety reasons, high winds and rain should be avoided when boxes are put up or removed.

**Dates/Frequency:** The boxes should be put up in early April before the martins return around mid-April. This will prevent establishment of starlings prior to arrival of martins. If a volunteer is available, boxes with previous limited martin use, boxes previously used by starlings, and newly relocated boxes should be monitored every 7-10 days during May. The boxes should be removed in early September after the nesting season and surveyed, cleaned, and repaired.

**Length:** Putting up and removal of the boxes takes approximately 4 hours each. Spring surveys take 1.5 hours and a fall productivity survey/cleaning takes 2 hours.

**Location:** Locations of the 12 boxes are detailed on the Purple Martin Nest Box Location listing and map.

**Methods:** Volunteers can be used to put up and remove boxes. A staff person knowledgeable in nest identification should conduct the fall nest box survey. A volunteer can assist in the survey, cleaning, and repair of the boxes. Species use will be recorded on the Purple Martin Nest Box Survey form. Boxes should be surveyed from a distance with binoculars during the nesting season. If the box is used exclusively by starlings or other undesirable

species, it should be taken down and cleaned out. If martins are also using the box, this will not be possible.

**Data analysis/report:** The survey form will be filed. If boxes are removed or relocated, the location listing and map will be updated and a memo for the files prepared detailing the changes.

### III. Special Considerations

A number of dead juvenile martins were discovered in the boxes after the 1990 and 1991 nesting season. All compartments should be sprayed with an insecticide prior to putting up in the spring. If a specimen can be obtained, it should be sent to the Madison Health Lab for analysis. The program will be monitored each year and boxes removed or relocated based on use and habitat conditions. Starling use should be controlled to the greatest extent possible to knock back the nesting population. The number of boxes should not exceed 12-15 boxes. Boxes should be repainted and repaired during the winter as needed.

### IV. Staffing and Costs

**Staff:** 1 staff @ 2 hours = 2 staff hours @ \$13/hour (GS-9) = \$26 total staff cost.

**Equipment:** on hand.

**Materials:** paint - \$40  
insecticide - \$10

**Total cost:** \$66

Prepared by: \_\_\_\_\_ Date: \_\_\_\_\_  
Refuge Biologist

Reviewed by: \_\_\_\_\_ Date: \_\_\_\_\_  
Refuge Manager

Approved by: \_\_\_\_\_ Date: \_\_\_\_\_  
ARD-Refuges & Wildlife

**Refuge:** Parker River NWR

**Procedure No.:** 12

**Species:** Kestrel, bluebird, & tree swallow

**Title:** Kestrel & Bluebird/Tree Swallow Nest Box Program

## **I. Purpose**

To provide nesting habitat for kestrels, bluebirds, and tree swallows and to monitor the success of the nest box program.

## **II. Procedure**

### **Personnel/Equipment:**

- 1 staff/volunteer
- extension ladder
- clipboard/pencil
- bird nest ID field guide
- Kestrel & Bluebird/Tree Swallow Survey form (attachment)
- Bluebird/Tree Swallow Nest Box Locations (map attachment)
- Kestrel Nest Box Locations (map attachment)

**Personnel qualifications:** Ability to identify kestrel, bluebird, and tree swallow nests and other species which may use the boxes.

**Weather conditions:** Spring surveys should not be conducted in inclement weather.

**Dates/Frequency:** If a volunteer is available, nest boxes will be surveyed every 7-10 days from mid-April through May. Boxes should again be surveyed after the nesting season in late summer or fall.

**Time/Length:** Spring and fall surveys should take approximately 1 hour.

**Location:** The two kestrel boxes and the 9 bluebird/tree swallow boxes are detailed on the Kestrel and Bluebird/Tree Swallow Nest Box Location maps, respectively.

**Methods:** Bluebird/tree swallow nest boxes should be opened and checked by a volunteer every 7-10 days each spring for use by house sparrows and other undesirable species. House sparrow nests will be removed only when incubation of a full clutch has begun. Kestrel boxes, because of their height, will be surveyed from a distance with binoculars. If the boxes are used by starlings or other undesirable species, it should be taken down and cleaned out. In fall, all boxes will be surveyed, repaired, and cleaned. This can be accomplished by a staff person knowledgeable in nest identification and a volunteer to assist. Species use will be recorded on the Kestrel & Bluebird/Tree Swallow Survey form.

**Data analysis/report:** The survey form will be filed. If boxes are removed or relocated, the location maps will be updated and a memo for the files prepared detailing the changes.

### III. Special Considerations

The program will be monitored each year and boxes removed or relocated based on use and habitat conditions. Starling and house sparrow use should be controlled for several years to knock back the Refuge nesting population. Nests should not be removed prior to incubation, as the birds can quickly rebuild. Once a nest is established, it takes 7-9 days for starlings to rebuild. The number of kestrel boxes should not exceed 5 and bluebird/tree swallow boxes should not exceed 20.

### IV. Staffing and Costs

**Staff:** 1 staff @ 1 hour/fall survey = 1 staff hour @ \$13/hr (GS-9) = \$13 total staff cost.

**Equipment:** On hand.

**Materials:** On hand.

**Total cost:** \$13

**Prepared by:** \_\_\_\_\_ **Date:** \_\_\_\_\_  
Refuge Biologist

**Reviewed by:** \_\_\_\_\_ **Date:** \_\_\_\_\_  
Refuge Manager

**Approved by:** \_\_\_\_\_ **Date:** \_\_\_\_\_  
ARD-Refuges & Wildlife

**Refuge:** Parker River NWR

**Procedure No.:** 13

**Species:** Osprey

**Title:** Osprey Platform Program

## **I. Purpose**

To establish a nesting population of osprey and to monitor the success of the platform program.

## **II. Procedure**

### **Personnel/Equipment:**

- 1 staff/volunteer
- clipboard/pencil
- bird ID field guide
- binoculars
- spotting scope
- Osprey Platform Survey form (attachment)
- Osprey Platform Locations (map attachment)

**Personnel qualifications:** Ability to identify osprey and other species that may perch on the platforms.

**Weather conditions:** Surveys should not be conducted in inclement weather.

**Dates/Frequency:** If a volunteer is available, platforms should be surveyed every 7-10 days from mid-April through August, depending on activity.

**Length:** Surveys should take approximately 1 hour for each site.

**Location:** Locations of the 2 platforms are detailed on the Osprey Platform Locations map.

**Methods:** The platforms should be observed from a distance with a spotting scope. The Cross Farm Hill platform should be observed from the Refuge road and the Nelson Island platform from the Nelson Island Road. Platforms should be surveyed on the same day to distinguish between pairs. Activity will be recorded on the Osprey Platform Survey form.

**Data analysis/report:** The survey form will be filed. If additional platforms are erected, the location map will be updated and a memo for the files prepared detailing the changes.

### III. Special Considerations

If a nesting population becomes established in the future, additional platforms will be erected as they are used. The new platforms should not exceed 8-10' in height for easier maintenance. A layer of nesting sticks should be placed in late winter on all new platforms. The Cross Farm Hill and Nelson Island platforms will eventually need to be replaced, with 8-10' platforms.

### IV. Staffing and Costs

**Staff:** Volunteer

**Equipment:** On hand.

**Materials:** On hand.

**Total cost:** \$0

Prepared by: \_\_\_\_\_ Date: \_\_\_\_\_  
Refuge Biologist

Reviewed by: \_\_\_\_\_ Date: \_\_\_\_\_  
Refuge Manager

Approved by: \_\_\_\_\_ Date: \_\_\_\_\_  
ARD-Refuges & Wildlife

ATTACHMENTS  
Forms and Maps

Refuge: Parker River NWR

Procedure No.:

Species:

Title:

I. Purpose

II. Procedure

Personnel/Equipment:

Personnel qualifications:

Notification:

Weather conditions:

Dates/Frequency:

Time/Length:

Route:

Methods:

Data analysis/report:

III. Special Considerations

IV. Staffing and Costs

Staff:

Equipment:

Materials:

Total cost:

Prepared by: \_\_\_\_\_ Date: \_\_\_\_\_  
Refuge Biologist

Reviewed by: \_\_\_\_\_ Date: \_\_\_\_\_  
Refuge Manager

Approved by: \_\_\_\_\_ Date: \_\_\_\_\_  
ARD-Refuges & Wildlife

#	Title	HRS	Cost
1.	Spotlight deer Survey	60	\$ 790
2.	Aerial deer Survey	6	\$ 1208
3.	Predator Scent Station	7	\$ 123
4.	Waterfowl/breeding pair	12	\$ 156
5.	Brood Survey	12	\$ 156
6.	Common Tern Survey	7.5	\$ 105
7.	Plover/Tern	300	\$ 4158
8.	Bird Survey	vol	\$ 88
9.	Bird Vocalization	18	\$ 234
10.	Wood Duck nest box	3	\$ 39
11.	Purple Martin nest box	2	\$ 66
12.	Kestrel/BB/Tree Swallow	1	\$ 13
13.	Osprey	0	0

428.5 HRS

\$ 7,136.00

• Wildlife Inventory Plan TOTALS

• Hours total; should include transport time eg office to survey site (+ survey time) and return; and any preparation time

• Costs should include \$.45-.50/mile vehicle costs; not just gasoline